The relative humidities are likewise found to be in very close agreement. The greatest difference at any particular level was 10 per cent, while in most cases the difference was considerably less.

The general agreement found in the other cases where two instruments were attached to the same balloon was of the same order as that shown in Figure 1.

Figure 2 shows the temperature-altitude graphs of two observations made on February 2, with an interval of

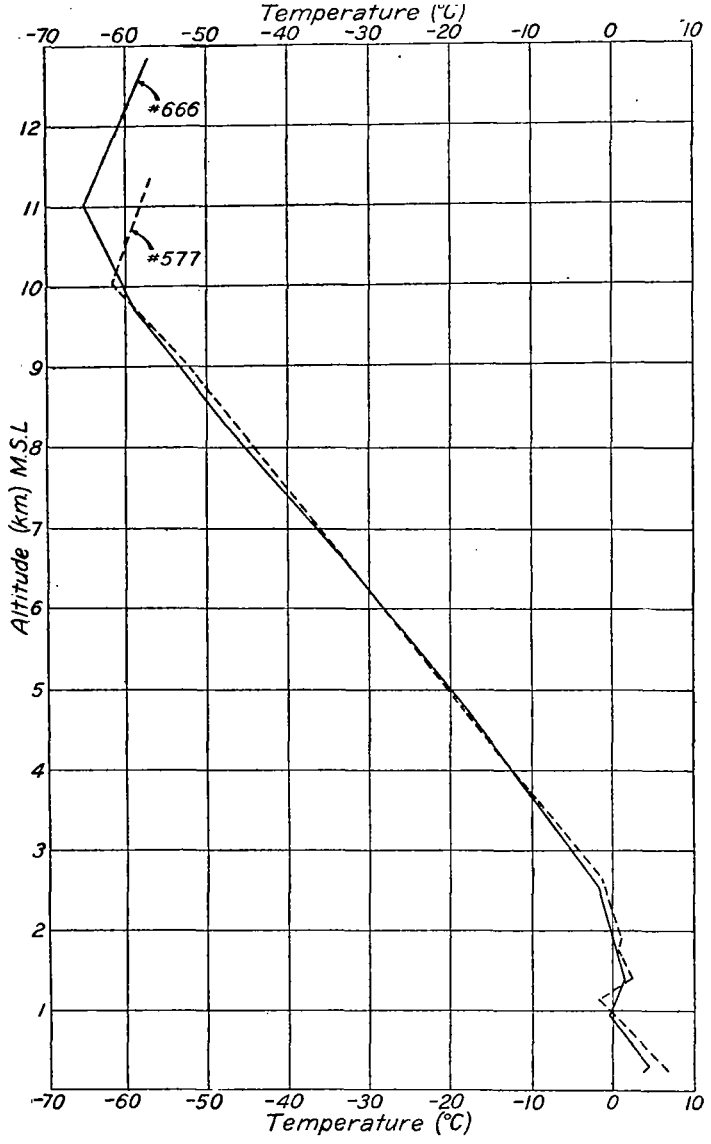


FIGURE 2.—Temperature-altitude graph of two sounding-balloon observations made 1 hour 23 minutes apart

1 hour and 23 minutes between them. The first balloon carrying meteorograph No. 577 was released at 3:55 p. m. (C. S. T.) (69 minutes before sunset), and the second balloon with meteorograph No. 666 at 5:18 p. m., or 14 minutes after sunset.

The agreement between the two graphs, it will be seen, is strikingly close up to the base of the stratosphere. The latter is found to be 1 km. higher at the time of the second observation. At least a part of this difference can be attributed to an actual change in atmospheric conditions since the descent portion of the record of the first observation indicated the stratosphere to be about 200 meters higher than on the ascent. A rise in the stratosphere would be expected from the fact that a high pressure area was moving in rapidly over Royal Center at the time.

It is evident that no vitiating effects from insolation resulted.

## WHY THE READINGS OF THE MERCURIAL BAROMETER ARE CORRECTED FOR BOTH TEMPERATURE AND LATITUDE AND THE READINGS OF THE ANEROID BAROMETER LEFT UNCHANGED

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It is an old story, of course, why we correct the readings of the mercurial barometer for both temperature and latitude and those of the aneroid for neither. Nevertheless, it may be worth telling again, since there is no convenient literature to which one can refer for an answer to this frequent question.

The aneroid barometer, a vacuum chamber with a flexible top attached to a movable index, responds only to changes in pressure, because the elastic reaction of its inclosed compressed spring that keeps the top from collapsing is practically independent of temperature, within the range of ordinary weather, and wholly independent of gravity. The *pressure* reading of the aneroid therefore needs no correction, save only that which might be necessary to make it agree with that of a standard instrument under the same conditions.

The mercurial barometer, on the other hand, a vertical glass tube sealed at the top, partly filled with mercury (vacuum above) and its open lower end dipping into a basin of mercury exposed to the air, balances, not the pressure of one fluid against a standard spring, as does the aneroid, but the pressures of two fluids against each other where they come together—in this case the pressure of the mercury against that of the air at their interface in the basin. Now, the pressure exerted by the mercury obviously increases directly with the vertical distance between its two surfaces; that is, with the "height" of the barometer, with the density of the mercury, and with the gravity pull per unit mass. But the density of the mercury varies with its temperature and the gravity pull with both latitude and height above sea level. Hence to find the *actual pressure* of the air from the current height of the barometer it is necessary to alter the reading to what it would be at some standard temperature (in addition to the similar correction for scale expansion) and standard gravity.

Why, though, this special interest in the pressure of the air rather than the mass of it overhead, for instance? Because the thing that makes the winds to blow, and thus effects weather transportation, is not primarily inequalities in the mass distribution of the air, but differences between the atmospheric pressures of neighboring places at the same level. This is why we commonly want the readings of our barometers to be in terms of actual pressures, or their equivalents, and that is why ordinarily the readings of the mercurial barometer are corrected for temperature and for latitude (gravity) and why the readings of the aneroid are left unchanged.

If, however, one had occasion to measure, or compare, the masses of air overhead at different places, as he might in the study of solar radiation, he would need to correct the readings of the aneroid barometer for latitude (gravity) and not the readings of the mercurial barometer.